



NSTAR ELECTRIC & GAS
FIVE YEAR VEGETATION MANAGEMENT PLAN
2013-2017

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1. INTRODUCTION

NSTAR Electric and Gas, a service company of Northeast Utilities (NSTAR) hereby submits this Vegetation Management Plan (VMP) in compliance with 333 CMR 11.00, *Rights of Way Management* regulations (Appendix 3); Chapter 132 B, *Pesticide Control Act* (Appendix 4); all pertinent clauses in *Chapter 85 of the Acts of 2000* (Appendix 8); MESA; MGL c.131, *Massachusetts Endangered Species Act* and its regulations, 321 CMR 10.00, *Massachusetts Endangered Species Regulations*, and 310 CMR 10.00, *Wetlands Protection* regulations. NSTAR also acknowledges the pertinent parts of 310 CMR 22.00, *Drinking Water* regulations of the Massachusetts Department of Environmental Protection, and all applicable Federal Occupational Safety and Health Act, Department of Transportation and Department of Environmental Protection regulations.

NSTAR delivers electricity to approximately 1.1 million electric customers in 81 municipalities and natural gas to approximately 300,000 gas customers in 51 municipalities. Electricity and natural gas is transmitted over hundreds of miles of distribution and transmission rights-of-way (ROW) throughout the central, eastern, southeastern, and cape and islands regions of Massachusetts. To ensure safe, reliable electric and gas service, NSTAR must keep these ROWs free from hazards and encroachments.

NSTAR Electric must also comply with Federal Energy Regulatory Commission standards including *NERC Standard FAC-003-1*, *Commissioner Order 69*. NSTAR Gas must comply with all applicable federal regulations including, but not limited to, the *Endangered Species Act*, *Migratory Bird Treaty Act*, all applicable Federal Energy Regulatory Commission (FERC) standards and the *FERC Wetland and Waterbody Construction Mitigation Procedures*, and Pursuant to the *Federal Natural Gas Act*, 15 U.S.C. §§ 717 et seq.; the *Federal Natural Gas Pipeline Safety Act*, 49 U.S.C. §§ 60101 et seq., and the *Federal Hazardous Materials Transportation Act*, 49 C.F.R., Part 192 (Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety

Standards), NSTAR Gas is required to adopt and implement an ongoing Operations and Maintenance Plan for purposes of maintaining the integrity and safety of its pipeline facilities. Additionally, in compliance with 49 CFR, Part 192, Subpart L (Operations), NSTAR Gas must maintain its easement to allow for aerial surveillance of pipeline conditions; to enhance its Damage Prevention Program; to facilitate planned cathodic protection surveys, and to allow access for both routine pipeline maintenance and emergency repairs.

NSTAR is, therefore, committed to managing vegetation at all of its facilities in a safe, environmentally responsible and efficient manner in full compliance with all applicable laws and regulations. In this effort, NSTAR is responsible for maintaining its ROWs free from hazards and encroachments. Vegetation is one of the items that can interfere with electric and gas service therefore NSTAR must stabilize the vegetation communities on its ROWs at an early stage of plant succession (low growing) to ensure the delivery of safe and reliable energy products to every customer.

Using an Integrated Vegetation Management Program (IVM), NSTAR's program is based on a 3-5 year selective herbicide application and mechanical treatment cycle. This program allows for the safe delivery of reliable electric and gas service while also minimizing the impact on property owners and supports a healthier, more diverse habitat for wildlife that depends upon early successional landscapes.

2. GOALS AND OBJECTIVES

NSTAR's VMP outlines and explains the standards of vegetation control expected from a carefully planned Integrated Vegetation Management (IVM) program. The primary objective of this VMP is to document the most appropriate practices and procedures designed to control non-compatible vegetation on the entire cleared width of its ROWs while reducing the risk of unreasonable adverse effects to the health and well being of humans, animals and the environment.

It also serves as an educational and communication link for state and municipal officials and the public. This objective will not only be accomplished through the VMP, Yearly Operational Plans (YOPs) and notification processes required by 333 CMR 11.00 and for Transmission Lines under Chapter 216, *An Act Relative to the Emergency Service Response of Public Utility Companies*, but with professionalism and courtesy on the part of NSTAR and contract field personnel.

The following are individual objectives of NSTAR's vegetation management program:

- To maintain ROWs that ensures the safe and dependable delivery of energy products
- To minimize and control vegetation that impedes ground and aerial inspections or interferes with the ability to access the ROWs and structures for maintenance or emergencies
- To encourage stable early successional ecological communities of primarily low growing plant communities
- To utilize an integrated vegetation management program on a three to five year cycle designed to maximize control of undesirable vegetation on the full width of the ROWs
- To remove or control non-compatible vegetation within the cleared width of the ROWs, along access roads, around structures, gates and the perimeter of electric substations
- To encourage the establishment of wildlife habitat that is compatible with and does not interfere with the primary function of the ROWs
- To protect the Priority Habitat of State-Listed species
- To control invasive, poisonous and other noxious plant species
- To follow all *sensitive areas* restrictions listed in 333 CMR 11.04

- To ensure that all vegetation management operations are conducted in a safe, effective manner and in conformity with all federal and state laws, regulations, and permit conditions
- To use experienced, trained vegetation management personnel with Massachusetts pesticide applicator licenses working under the direct supervision of a certified pesticide applicator
- To allow for unplanned tasks for which all precautions are taken to utilize the correct treatment methods and to protect sensitive areas (construction, restorations, hazard tree removal, etc.)
- To maintain the flexibility necessary to accommodate unique situations and the need for more appropriate techniques in accordance with new regulations, scientific advances, operational experience and/or comments from municipalities, state agencies and contractors (when necessary, following the procedures in 333 CMR 11.05(4)(d)).
- To promote positive public relations with landowners, state and municipal officials, contractors, and the public

3. CHAPTER 132B AND 333 CMR 11.00

The purpose of this chapter is to conform the laws of the commonwealth to the Federal Insecticide, Fungicide, and Rodenticide Act, Public Law 92-516, as amended, and the regulations promulgated there under and to establish a regulatory process in the commonwealth. The exclusive authority in regulating the labeling, distribution, sale, storage, transportation, use and application, and disposal of pesticides in the commonwealth shall be determined by this chapter. (*MGL 132B, Section 1*)

Chapter 132b (Massachusetts Pesticide Control Act) was created to ensure a clear and uniform set of standards for the entire Commonwealth of Massachusetts *in order to protect the public from the negative impacts that arise from fragmented, decentralized, sets of standards*. In this effort, the Commonwealth, through the Department of Agricultural Resources (DAR) retains the sole right to regulate the use of pesticides, including herbicides, throughout Massachusetts. DAR takes this responsibility extremely seriously and the regulations promulgated under Chapter 132b are stricter than Federal standards.

The purpose of 333 CMR 11.00 is to establish a statewide and uniform regulatory process which will minimize the uses of, and potential impacts from herbicides in right of way on human health and the environment while allowing for the benefits to public safety provided by the selective use of herbicides (*333 CMR 11.01*).

333 CMR 11.00 is the most comprehensive rights of way regulation in New England. It requires an Integrated Pest Management (in this case IVM) approach to right of way vegetation management; the establishment of standards and procedures to prevent unreasonable risks to humans or the environment, and a multi-layered system of public and municipal notification that requests input about environmentally and culturally sensitive areas. All of this is outlined in NSTAR's VMP, annual YOPs, *The Environmental Monitor* Notice, 21 day notification, Public Water Supplier notification and 48 hour newspaper notice which serve as guides for the public, state and municipal officials, vegetation management contractors and NSTAR personnel.

To ensure compliance with Chapter 132b and 333 CMR 11.00, DAR performs routine inspections of rights-of-way treatment crews, retains chemists, and perform further tests before approving a limited list of herbicides approved for use in Sensitive Areas (pursuant to 333 CMR 11.04 (1)(d)).

As detailed in the VMP and YOP, NSTAR's IVM program strictly adheres to all the requirements of Chapter 132b and 333 CMR 11.00. NSTAR only retains herbicide application treatment contractors that hold Massachusetts' certifications and licenses to apply pesticides. These licenses are only granted after comprehensive testing and require ongoing training to maintain. All Sensitive Areas (see section V) are treated appropriately using either mechanical treatment methods or Commonwealth of Massachusetts recommended herbicides for use in Sensitive Areas. In fact, NSTAR only uses these recommended herbicides on the entire length and cleared width of its ROW corridors.

Beyond the requirements of 333 CMR 11.00, NSTAR, in compliance with all applicable state and federal laws and regulations and common courtesy, also notifies "abutters" (houses and businesses that abut the rights-of-way being treated in that year) within view of the ROWS before treatments begin. Treatment contractors are required to leave door hangers or talk personally with abutters which allow the contractor to answer site specific questions, identify private wells and help explain the program.¹

¹ On Transmission ROWs, as defined by section 1 of chapter 164 of the General Laws, NSTAR and its contracts shall make a good faith effort to notify ROW abutters not less than 30 days before any vegetation maintenance, except emergencies occurs on Transmission ROWs. NSTAR will comply with all regulations promulgated under Chapter 216, *An Act Relative to the Emergency Service Response of Public Utility Companies*.

4. IDENTIFICATION OF TARGET VEGETATION

NSTAR ELECTRIC ROWs

Pursuant to the policy and intent set forth in NSTAR's VMP, all vegetation must be removed that obscures the ROW corridors and grows tall enough to interfere with the safe, efficient and legal operation of an electrical power line. In the wire zone, trees and brush are targeted, and native, low growing plant communities that have a mature height less than 3' are established. In the border zone, incompatible trees and brush are targeted, and the growth of native trees and shrubs that have a mature height less than 15' is encouraged.

The primary target is all incompatible tree species (woody vegetation with a mature height > 15' tall at maturity) within the cleared width of the ROW; except those species that are under the purview of the Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife (NHESP) which will be treated on a case by case basis. Examples of target species include, but are not limited to:

Alder	Cherry	Pine
Aspen	Hemlock	Maple
Beech	Hickory	Oak
Birch	Locust	Sassafras

There are more non-target vegetation species on an Electric ROW than targets. In fact, ROW's are one of the primary early successional plant communities remaining in New England. As a result, many plant and animal species use ROWs as their homes, feeding grounds or nurseries. Certain plant species, therefore, are generally encouraged on the ROW through the use of an IVM program:

- Most herbaceous growth is acceptable and encouraged
- Shrubs that mature less than 15 feet in height are not usually targets *unless* due to their location or attributes they interfere with the function of the ROW.

Certain categories of non-tree species are targets under some circumstances, because of their location and/or their nature. Dense woody vegetation, shrubs and vines are targets where they are capable of interfering with the inspection and maintenance of the poles, wires, and along access roads, paths and gates which need to be kept clear,

especially for emergencies. Additionally, as will be discussed below, noxious plant species including invasive, poisonous and nuisance plant species are considered targets.

Examples of non-tree species, including noxious plant species generally considered targets, include, but are not limited to:

Autumn Olive	Hawthorne	Purple Loosestrife
Blackberry	Honeysuckle	Sumac (Staghorn and Poison)
Buckthorn	Japanese Knot Weed	Virginia Creeper
Common Reed	Multiflora Rose	Willow
Grapevines	Oriental Bittersweet	
Greenbriar	Poison Ivy	

NSTAR Gas ROWs

NSTAR Gas's goal for its natural gas pipelines is necessarily different than NSTAR Electric's power lines. To meet regulatory compliance, NSTAR Gas must establish stable, predominately grass, forbs and low growing herbaceous plant communities along its pipeline ROWs. According to Title 49, Part 195.146 of the Federal Code of Regulations, NSTAR must regularly patrol its pipelines by ground and/or aerial inspections. Tall, dense vegetation impedes the detection of leaks and other potential problems, and woody vegetation obstructs the visibility of and access to valve sites, pipe corrosion test stations, mile marker posts, and other pipe location markers. Additionally, the routine removal of tall vegetation renders the ROW, and its buried high pressure natural gas pipeline, distinguishable from adjacent properties which may prevent third-party damage.

The primary target vegetation on NSTAR's gas ROWs, therefore, includes the same vegetation as on the electric ROWs, plus most woody vegetation including all shrubs. This includes those that mature under 12 feet, including, but not limited to:

Dogwood	Sumacs
High Bush Blueberry	Viburnums
Mountain Laurel	Witch Hazel
Speckled Alder	

A partial list of compatible early successional plants includes, but is not limited to, Low-bush Blueberry, Huckleberry, Sweet fern, grasses, forbs, ferns and wildflowers; however, the first three items on the list are not acceptable around pipeline facilities/structures such as valve sites, pipe corrosion test stations, mile marker posts, and other pipe location markers.

***NOXIOUS WEEDS (INCLUDES INVASIVE PLANTS, POISONOUS PLANTS AND
NUISANCE PLANT SPECIES)²***

NSTAR intends to control “noxious weeds,” including invasive, poisonous and nuisance plant species with herbicides and mechanical treatment methods. Invasive plant species have become an increasing concern throughout Massachusetts in areas that include ROW corridors where they can spread rapidly and then move into the adjacent landscape. NSTAR also plans on treating poisonous and nuisance plant species at sites on its ROWs identified as having a high risk of posing a health hazard to all individuals working on or traversing a ROW and can impede a rapid response in an emergency.

Invasive Plant Species

The control of invasive plant species is of growing concern in Massachusetts. Many of these non-native plant species were planted for their showy flowers, vigorous growth, erosion control and abundant fruits that attract wildlife (not all introduced species are defined as "invasive"). According to The National Invasive Species Council: "An invasive species is a non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human, animal, or plant health."³ They are characterized by their ability to spread extremely rapidly and they have already spread well beyond their original cultivated areas; effected areas are often simultaneously impacted by multiple species.

Traits held by invasive plant species include, but are not limited to:

- Aggressive growth and maturity
- Quick spread by seed and/or rhizome
- Little or no natural pests or diseases
- Tolerance of many environments
- Difficult to remove or control
- Tend to overwhelm native species

Recognizing this serious threat to our environment, NSTAR's IVM program takes into account the control of invasives using both mechanical and/or chemical control

²“NOXIOUS WEED.—The term “noxious weed” means any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment.” (Public Law 106–224—June 20, 2000, Title IV—Plant Protection Act).

³Taylor, Jeff. VELCO 2012 Contractor Training, December 2012.

techniques, as necessary in specific locations. Some examples commonly found on ROWs include, but are not limited to:

Autumn Olive	Honeysuckle	Oriental Bittersweet
Black Locust	Japanese Knot Weed	Phragmites
Glossy Buckthorn	Multiflora Rose	Purple Loosestrife

Poisonous Plants

Massachusetts, particularly the southeast, has an abundant population of poison ivy and other poisonous plants. This poses a health hazard to NSTAR personnel, contractors and the public-at-large and leads to increased incidences of first aid and OSHA recordable incidents. Mechanical methods do not reduce the spread of these populations—particularly poison ivy—therefore NSTAR plans to use herbicides to spot treat poisonous plants at sites identified as having a high risk of posing a health hazard.

Nuisance Vegetation

Nuisance vegetation are plant species that pose a risk to the safety and health of individuals working on or traversing a ROW and it can impede a rapid response in an emergency. These plants have heavy thorns, dense foliage and/or impenetrable stems (many are also invasive plant species); examples include, but are not limited to:

Blackberries and raspberries	Greenbrier
Common and Glossy Buckthorn	Hawthorne
Grapevines	Multiflora Rose

NSTAR plans to use a combination of mechanical and chemical treatment methods to reduce their spread.

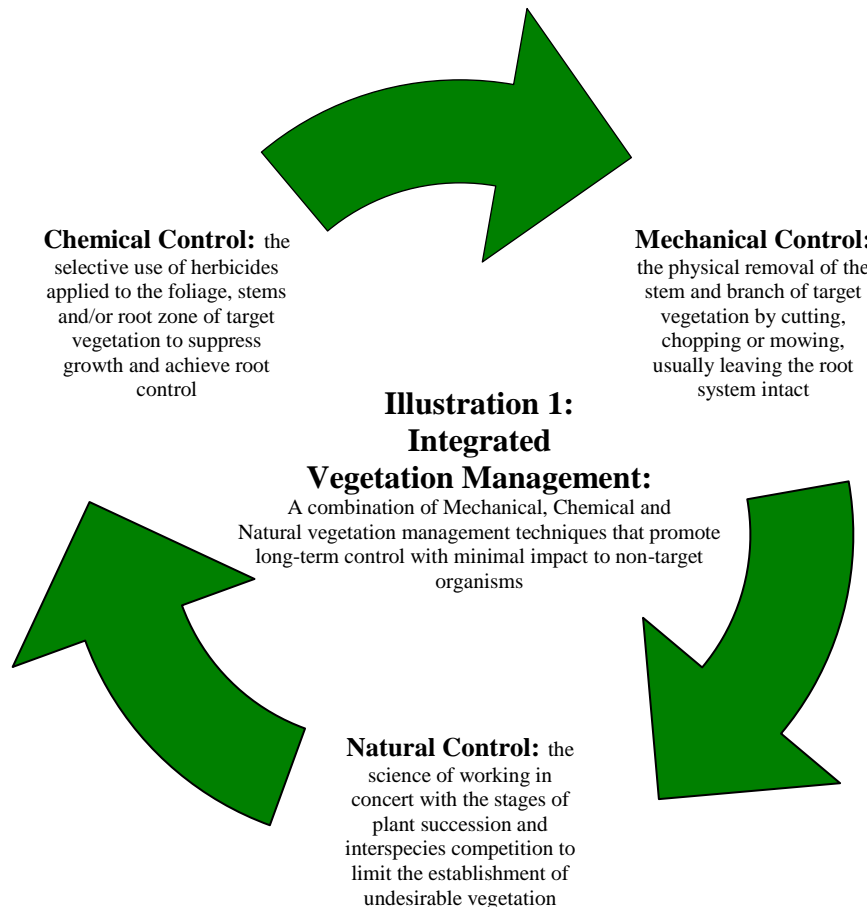
IDENTIFICATION METHODS DURING VEGETATION MANAGEMENT ACTIVITIES

To insure the accurate identification of target and non-target vegetation, all vegetation management contractors are required to supply personnel trained to recognize plant species typically found growing on utility sites and to recognize the difference between target and non-target vegetation; including the ability to identify the appropriate early successional communities preferred on electric and gas ROWs.

5. INTEGRATED VEGETATION MANAGEMENT

NSTAR's VMP takes into consideration all factors involved in the maintenance and operation of electric and pipeline ROWs. It reflects NSTAR's intent to prevent any unreasonable adverse effects to the environment and to the safety and health of animals and humans while supporting NSTAR's primary obligation of delivering energy products. The purpose in implementing the vegetation control program in this VMP is to advance the consistent and safe operation of NSTARs ROWS using a three part IVM program consisting of mechanical, chemical and natural controls (see Illustration 1).

Utility IVM programs are designed to work in concert with certain stages of ecological succession. Plant life is by its nature unstable, it is, however, governed by a relatively predictable process of change in composition or structure known as ecological succession. In New England, succession strives towards the climax forest, but is interrupted by natural or man-made disturbances both intentionally and accidentally.



Utility IVM programs are an intentional man-made disturbance that supports the need to deliver energy products by encouraging the stabilization of early successional ecological communities by discouraging the establishment of and when necessary removing certain types of vegetation.

Many New England early successional ecological communities are compatible with NSTAR's ROWs. Depending upon if an electric or gas ROW, these may include shrub-lands, barrens, grasslands, fields, meadows, wetlands, vernal pools and heaths all of which, if left alone, are not stable. All of these sites support diverse, well-dispersed plant, animal and insect species populations, including many that are threatened or endangered. The only difference between electric and gas ROWs is that gas pipelines can only support the lowest growing plant communities consisting of primarily of grasses, forbs and herbaceous growth.

Mechanical and chemical controls are the direct techniques used to target undesirable vegetation and include mowing, hand-cutting and herbicide applications. Utilizing these direct techniques results in the natural control component of this IVM program; desirable, lower growing plants are given the opportunity to form dense thickets or communities. According to many decades of on-going field observation and research, these low growing plant communities inhibit the germination and growth of tree seedlings through competition (for light, moisture, nutrients), assisted by depredation of wildlife (browsing/feeding) and possibly by allelopathy.⁴ In other words, natural controls lower the dependence on chemical and mechanical controls. However, natural controls are only possible through the selective use of chemical and mechanical controls.

All three components of IVM depend upon the others in a continuous cycle that employs the unique advantages of each. Without combining all three, target plant species can develop increased stem densities that require more intense control measures, and ecological succession can run its course. A non-selective chemical only program would only result in an equal environmental impact and without mechanical and chemical controls; natural controls would not successfully discourage succession.

⁴Research is still underway about the "natural herbicide action" of allelopathy, the chemical inhibition of the germination or growth of plants by other plants. Although scientists have been studying allelopathy since the 1880s, our understanding is not complete, the processes are extremely complicated and the research is still ongoing, as a result, it is still under debate. What is clear is that certain plants move into and dominate an area.

There is fifty years' worth of evidence in New England showing that this approach has actually, over time, significantly reduced the per-acre application rate of herbicides on utility ROWs and reduced the need for intensive mechanical controls.⁵ This is primarily due to the success of natural controls that have helped reduce the stem densities of target vegetation. Throughout New England, the average herbicide application rate at utilities with established IVM programs (including NSTAR) is approximately one pint to two quarts per acre per treatment year in a three to five year treatment cycle.⁶ Studies in New York have documented similar reductions in herbicide use through stable plant community management (natural control).⁷

In addition to the reduction of direct control techniques, an IVM program is also well suited to treating environmentally sensitive areas. With careful thought and planning, an IVM program has the flexibility to manage these sensitive areas because of the ability to apply different control techniques to the appropriate areas. For example, to manage wildlife habitat for native species might require the removal of certain plant species, including some that would otherwise be non-targets and others that are considered invasive species. This includes the removal of Purple Loosestrife and Phragmites to re-establish Cattail swamps.

NSTAR's application of its IVM program takes into account instances in which culturally sensitive areas, such as inhabited and agricultural areas, require the application of limited or adapted IVM techniques and control methods. These are areas of a right-

⁵Environmental Consultants, Inc. *Study of the Impact of Vegetation Management Techniques on Wetlands for Utility Rights of Way in the Commonwealth of Massachusetts*. Final report prepared for New England Electric et.al, 1989; Environmental Consultants, Inc. *Determination of the Effectiveness of Herbicide Buffer Zones in Protecting Water Quality on New York State Powerline Rights-of-Way*. Final report for the Empire State Electric Energy Research Corporation, 1991; K.H. Deubert. *Studies on the Fate of Garlon 3A and Tordon 101 Used in Selective Foliar Application in the Maintenance of Utility Rights of Way in Eastern Massachusetts*. Final Report prepared for New England Electric et. al., 1985; N.H. Nickerson, G.E. Moore and A.D. Cutter. *Study of the Environmental Fates of Herbicides in Wetland Soils on Electric Utility Rights-of-Way in Massachusetts over the Short Term*, Final Report prepared for New England Electric et.al, December 1994; Matt Hickler, NHESP approved Review Biologist, Reports for TransCanada, National Grid, NSTAR Electric, and Northeast Utilities under 321 CMR 10.00 Massachusetts Endangered Species Act Regulations, 2006-2010.

⁶*Utility Transmission Forestry Herbicide Use Summary Records* for NSTAR Electric, Vermont Electric Power Company, TransCanada Hydro Northeast, Inc and National Grid USA Electric Companies (see National Grid 5 year VMP 2009-2013, p. 9).

⁷C.A. Nowak and L.P. Abrahamson, *Vegetation Management on Electric Transmission Line Rights-of-Way in New York State: The Stability Approach to Reducing Herbicide Use*, Proceedings of the International Conference on Forest Vegetation Management, Auburn University, April 1993.

of-way in which the economic, agricultural, social and recreational use of the landscape affect the decision making processes. Examples include: golf courses, residential areas, Christmas tree farms, active pasture and crop lands, or where unique situations warrant this consideration. This does not preclude the use of chemical and/or mechanical controls. Instead, these landscapes can limit or alter their application; for example, target vegetation might not grow in well-kept lawns but may still grow around poles, guywires, cathodic protection installations and appurtances.

In conclusion, to utilize the most protective and effective IVM program, NSTAR will continue to monitor the most current research in treatment methods and products. Furthermore, in maintaining early successional ecological communities, NSTAR will also continue to support the habitat of invertebrates, vertebrates and plants that require this type of habitat, many of which are state-listed as endangered, threatened or rare.⁸

⁸There are many texts on this subject, some of which are listed in the short bibliography in Appendix 10, this is just one excellent example: James D. Oehler ed., Darrel F. Covell, ed, Steve Capel, ed and Bob Long, ed. *Managing Grasslands, Shrublands and Young Forests for Wildlife; A Guide for the Northeast*. The Northeast Upland Habitat Technical Committee, 2006.

6. MECHANICAL CONTROLS

Mechanical controls include hand cutting and mowing of brush, and side trimming and removal of mature trees. They are used in conjunction with chemical controls and help establish natural controls when used in a fully implemented IVM program. The following section defines all three mechanical control methods, lists their uses and sets some basic guidelines.

HAND CUTTING

Definition:

The use of chainsaws and brush saws to remove the stem and/or branches from the plant's root system.

Uses:

- Target vegetation 15' tall at maturity and over
- Conifers exceeding 6' in height or all conifers in wetlands
- In easement restricted areas
- In chemical restricted Sensitive Areas
- In visual buffers in conjunction with cut stump surface treatments (see below)
- Allows for selectivity in target vegetation.

Operational Practices:

- Trees are cut as close to the ground as possible so that stump height is no higher than root swell
- Cut stems are windrowed and diced or chipped
- Depending on the situation windrows are positioned parallel along the edge of the ROW corridor
- Cut woody vegetation in yards or recreational sites will be chipped and disposed of, or removed to adjacent areas
- Diced woody vegetation should not exceed 2 ft. in height
- Larger trees are limbed and lopped
- Cut woody vegetation is not left on or across paths, roads, fence lines, stone walls or in waterways or in such a manner that would permit it to wash into these areas
- The placement of cut woody vegetation must comply with applicable State Fire Marshall's regulations
- Chipping is used on sites designated by NSTAR when dicing or piling is prohibited or impractical. When necessary, wood chips will be removed
- No chips shall be left in wetlands
- All cut cherry is removed from active pastures.

MOWING

Definition:

The cutting, severing or shattering of vegetation by large rotary or flail mowers.

These heavy-duty mowers, usually ranging from 3-8 feet wide, are typically mounted on large four-wheel drive rubber tired tractors or tracked vehicles.

Uses:

- Can be the preferred mechanical technique, especially on sites where extremely tall and dense target vegetation makes hand cutting inefficient and expensive
- Where herbicides are prohibited
- On non-restricted sites, mowing may be used to remove tall target vegetation followed by herbicide treatment to the resprouts during the following growing season.

Operational Practices:

- Mowing may be restricted by terrain conditions such as steep, rocky sites or wet soils
- It necessitates the use of hand cutting methods next to obstructions such as stone walls and fence lines
- Mowing brush can throw large chips and debris great distances from the cutting equipment
- Extreme care must be exercised to insure the safety of the general public
- In populated areas it requires employing someone to prevent people and animals from coming too close to the work site

SIDE PRUNING

Definition:

Side pruning or removal of encroaching tops and/or branches of trees growing on or near a ROW. This management technique is usually accomplished by the use of an aerial lift mounted on either a large truck or off-road vehicle. Tree climbing is sometimes employed in situations where terrain prevents the passage of equipment.

Uses:

- Maintaining the edge definition of the ROW corridor
- Easier inspections of vegetation conditions during aerial patrols
- Necessary to stay in compliance with *NERC Standard FAC-003-1*.

Operational Practices:

- All trimming activities are performed in accordance with proper arboriculture practices to insure the health and aesthetic value of the trees (see Operational Guidelines for Applicators)

- All trimming activities are in compliance with all current applicable regulations.

REMOVALS

Definition:

Removal of trees that have become a hazard to the ROW or that may have been overlooked in previous treatment cycles and allowed to encroach the ROW and the lines and conductors. In these cases, Trees will be removed in such a way that they cannot strike wires, guy wires, structures, appurtenances and adjacent properties. In most cases these trees will be addressed using aerial lift equipment, but may require climbing where terrain dictates. Larger overhanging limbs may require rigging to safely control the fall of cut material. Trees that do not overhang or directly threaten the line may be “pieced down” by removing material from the top down in small sections that cannot strike the line or cause damage. In cases of severe encroachment on a larger scale, qualified and appropriate timber harvesting equipment and contractors may be employed to clear the ROW up to the edge of easement.

Uses:

- Maintaining the edge definition of the ROW corridor
- Easier inspections of vegetation conditions during aerial patrols
- Necessary to stay in compliance with *NERC Standard FAC-003-1*.

Operational Practices:

- All removal activities will be performed by qualified line clearance arborists
- Care will be taken to accurately locate the bounds of activity, to minimize erosion and unnecessary hydrological damage due to ruts, and to minimize impact to the environment.
- Measures may include matting of wetland areas, installation of silt fences and chipping and removal of all debris.

7. MECHANICAL CONTROLS: BENEFITS AND LIMITATIONS

An IVM program does not function without mechanical controls. Between regulatory restrictions and the need to open access to treatment areas, chemical controls cannot work without mechanical controls. Likewise, mechanical controls and chemical controls work together to support the establishment and viability of natural controls and it takes all three components of an IVM program to support wildlife habitat.

In some areas, mechanical controls are the preferred method; the use of herbicides may be prohibited or restricted in various sensitive areas leaving mechanical treatment methods as the only options. These include defined distances around drinking water supplies both private and public, wetlands or water over wetlands, rivers, certified vernal pools, and agricultural or inhabited areas (see sensitive area section below). Certain Priority Habitats defined by NHESP call for the use of mowing instead of/or in conjunction with herbicide applications to encourage the health or restrict the height of various host plants.

Mechanical treatment methods are also used on vegetation over 15 feet in mature height in preparation for herbicide treatments; in individual areas deemed as sensitive; around structures; access roads, and in areas of thick impenetrable vegetation. Mechanical treatment methods may be combined with chemical controls, including foliar and cut stump treatments, to prevent resprouting. Alternately, where large areas of high density target species have exceeded maximum herbicide treatment heights, a mechanical treatment may be more practical followed, in one or two growing seasons, by an herbicide application to obtain effective control.

On their own however, mechanical controls are only a short-term solution to many vegetation control problems on a ROW system. With the exception of most conifer species (pitch pine does resprout), cut vegetation resprouts from dormant buds on the root collar resulting in a stem density significantly greater than the original vegetation. An annual program that uses only mechanical treatment cycles therefore generally increases dense areas of woody vegetation. This vegetation competes with and dominates the low growing vegetation NSTAR wishes to encourage. As a result, bio-diversity is diminished; wildlife habitat is degraded; and access to the ROWs and the ability to perform maintenance and emergency activities are all limited.

When relying on mechanical control methods alone, dense areas of target vegetation also become costly and dangerous to hand-cut with power saws and are best controlled by mowing. Large mowing equipment, although an excellent IVM tool, can have a negative impact on non-target plant communities whose establishment is crucial to developing successful natural controls. The scarification of the soil surface also creates a potential seedbed for fast growing, pioneering target species such as poplars, cherries, birches and various invasive species. This can increase the frequency of the maintenance cycle and destroy the dominance of stable, diverse early successional plant communities. Similarly, sensitive areas, such as wetlands and residential areas can be adversely impacted when crossed by mechanical maintenance equipment.

Mowers, chainsaws and brush saws also represent a higher risk to workers than herbicide applications.⁹ Mowing machines throw rocks and pieces of wood and objects great distances exposing both the workers and the public to safety risks from flying objects. No matter how carefully executed, at the conclusion of mechanical treatment operations, stumps are left on the ROW, which are a tripping hazards to both workers and the general public; they can also puncture tires and damage equipment.

This section is not intended to discourage the use of mechanical controls *instead* it supports the fact that all three components of an IVM program have their limitations. This is actually the strength of an IVM program. Understanding the limitation is just as important as understanding the strengths of mechanical as well as chemical and natural controls. Then, when crafting an IVM program that suits the conditions of individual ROWs the limitations are restricted while the benefits can be utilized to meet the goals of reliability in the most responsible fashion possible.

⁹ See Appendix 10.

8. CHEMICAL CONTROLS

Chemical controls are herbicide applications which include foliar, basal and cut stump surface treatments (CST). They are a vital year-round component of an IVM program in establishing and stabilizing early successional plant communities and the development of natural controls to maintain this goal. The following sections define all three control methods, lists their uses and sets some basic guidelines.

GENERAL GUIDELINES

- **Sensitive Area Approved Herbicides** (see Section 9 below for definition) will be the preferred materials applied on NSTAR's ROWs in their IVM program, but new herbicides are being developed and released and NSTAR reserves the right to set up experimental plots to test their effectiveness and their use in protecting the ecological communities on NSTAR's ROWs.
- An advance person or "prep-cutting" crew will patrol the ROWs before the herbicide application operation
- Sensitive areas will be identified and buffers appropriately measured and flagged, then verified and recorded when appropriate
- Herbicides will NOT be applied during the following adverse weather conditions:
 - ✓ During high wind velocity, per 333 CMR 11.03
 - ✓ Foliar applications during periods of dense fog, or moderate to heavy rainfall per 333 CMR 11.03
 - ✓ CST or basal applications during periods of heavy rainfall
 - ✓ Foliar applications of volatile herbicides during periods of high temperatures (90 plus degrees Fahrenheit) and low humidity
 - ✓ CST or Basal application when deep snow (i.e. 6" plus or ice frozen on stem or stump) prevents adequate coverage of target plants to facilitate acceptable control
 - ✓ Basal applications when the stems are excessively wet from moisture
- Herbicides are not applied:
 - ✓ To target vegetation standing in surface water
 - ✓ Within chemical restricted Sensitive Areas per 333 CMR 11.00
 - ✓ To active pasture land unless arrangements are made with land owners to move livestock to an alternative location
 - ✓ Under unique circumstances that might unreasonably jeopardize the health and safety of animals, humans or the environment
- All conifers over six feet tall will be controlled by cutting. Where appropriate, all pitch-pine stumps will be treated with an herbicide to prevent resprouts.

FOLIAGE APPLICATIONS

Definitions:

The application of herbicides to fully developed leaves, stems, needles or blades of a plant.

Low Volume Foliar:

Hand-operated pumps or motorized, backpack sprayers with herbicide concentrations usually ranging from 3-20% The backpack sprayer produces an air current that delivers the herbicide mixture from the portable spray tank to the target vegetation. The hand sprayer uses a column of water. In both cases, the amount of herbicide solution applied only dampens or lightly wets the target vegetation, instead of being applied to the point of run-off. This minimizes the amount of excess herbicide drip from target species onto desirable ground cover. Low volume applications also eliminate the need to bring heavy equipment on the ROW for the transportation of large quantities of herbicide solution.

Modified Low Volume Foliar:

Uniform, penetrating herbicide mixtures delivered to dense target vegetation. This technique usually involves 200-500 gallon hydraulic sprayers mounted on a truck or tractor equipped with several hundred feet of hose and hand held spray guns. The herbicide mixture, usually a 1-2% concentration, can be directed to specific target vegetation for spot treatments or broadcast for uniform coverage in dense thickets of nuisance plants such as poisonous, noxious or invasive plant species.

General Uses:

- An economical and effective control method in medium and high brush densities
- Effective control of invasive, noxious and poisonous vegetation
- Contributes to establishing and stabilizing early successional plant communities
- Allows for selectivity in targeting vegetation.

General Guidelines:

- Herbicides are mixed or diluted with water
- Herbicides are applied as a uniform spray over the entire plant's foliage
- Low pressure foliar application equipment will be adjusted to apply a spray pattern that achieves effective control at the lowest application rate

- Application period usually extends from early June through the beginning of leaf abscission in early fall
- Anti-drift agents are added to the mix or solution in all foliage applications to reduce the potential of herbicide drift beyond target vegetation—drift control agents reduce the break-up of sprays into fine droplets and offer increased selectivity, leaf tissue penetration, and herbicide deposition on target plants
- Foliar applications can be made, and are effective, in light mist conditions
- When foliar applications are stopped by rainfall treatment will not resume until the rain ends and is not actively running off the leaf surface
- Foliage application operations cease in wind conditions that make it impossible to prevent herbicide movement beyond the target area.

LOW-VOLUME STEM BASAL

Definition:

The selective application of herbicides in an oil solution to the lower portion of the plant stem.

Uses:

- Year-round application technique, except during deep snow conditions that cover the target area
- Typically employed during the non-foliage season when target stems are easier to identify without the interference of lush, tall grasses or ferns.

Guidelines:

- Utilizes hand-operated backpack sprayers
- Utilizes special blended light petroleum oil as the diluent, enabling the herbicide solution to penetrate the bark tissue and translocate within the target plant species
- Not an appropriate method to control high target stem densities due to high herbicide rates per acre and unreasonable labor costs
- Extending the herbicide treatment period beyond the foliage season justifies using this technique for appropriate vegetation conditions
- May be the appropriate choice for visually sensitive areas or where extreme selectivity is desirable.

CUT STUMP SURFACE TREATMENT (CST)

Definition:

The application of an herbicide mixture to the cut surface of a stump immediately following or during a cutting operation using an herbicide concentration, usually 50% diluted in water or a non-freezing solution.

Uses:

- Year-round applications except during deep snow conditions that prevent cutting the stumps low enough
- Offers the opportunity to chemically treat undesirable vegetation in sensitive areas where other methods are not possible.
- Commonly used to prevent resprouts when hand cutting vegetation over twelve feet in height in preparation for a foliage application.

Guidelines:

- Application equipment includes low-volume, backpack, hand-pump sprayers; hand held squirt bottles; paintbrushes, or sponge applicators
- It is only necessary to treat the phloem and cambium tissue, regardless of the stump diameter
- Ideally, treatment should be made to freshly cut stumps
- It is best to avoid using it during the season of high sap flow
- Not practical in moderate to heavy stem densities.

Plant Growth Regulators

Definition:

Tree Growth Regulators (TGR's) are plant growth regulator chemicals that manage or reduce the potential growth rate of trees.

Uses:

- They are useful tools especially along street distribution lines where repetitive trimming is necessary to maintain adequate tree-wire clearances
- Their use can lengthen the time frame between trimming cycles and improve the aesthetics of street and yard trees that may otherwise require removal or severe pruning.
- They are a type of "spot" treatment and are not a general IVM management tool.

Guidelines:

- Applied as basal drench around the base of the tree or

- Applied as a soil injection next to the buttress root zone
- Unless included in the *Sensitive Area Material List* kept by DAR, they will not be used in any Sensitive Areas, including within 100 feet of an inhabited area.

9. CHEMICAL CONTROLS: JUSTIFICATION, RATIONALE FOR USE AND GUIDELINES AS PART OF AN INTEGRATED VEGETATION MANAGEMENT PROGRAM

State and federal regulations require NSTAR to deliver energy products to its customers in a safe and efficient manner and to control vegetation on its ROWs. To meet these obligations in an ecologically sound manner is, according to a wide range of studies, best completed by stabilizing the early successional vegetation communities on the ROWs.¹⁰ To do this, NSTAR needs to use all the treatment methods available while encouraging the establishment or stability of a landscape that is both accessible and which supports the health and hopefully growth of native plant and wildlife habitat.

In an IVM program, chemical controls are the method that achieves long term vegetation control because the entire target plant, *including the roots*, is controlled by the use of herbicides, stopping their spread by resprouts, adventitious root suckering and rhizomes. Eliminating the ability of the treated targets to return also increases the length of time between treatment cycles by reducing their recurrence and stem counts. This is achieved by scheduling herbicide applications to sustain acceptable vegetation control at minimal application rates.¹¹ When all of these factors are taken into consideration herbicide applications can minimize the amount of manpower and equipment and their repeated impact on the environment, including unintended petroleum and hydraulic fluid leaks from mechanical equipment.

NSTAR chooses herbicide formulations that, when used appropriately, are a safe method of vegetation control, are low in acute toxicity, are not known to bio-accumulate and, as applied, have a short half-life with low soil mobility.¹² These formulations are

¹⁰Belisle, Francis. "Wildlife Use of Riparian Vegetation Buffer Zones in High Voltage Powerline Rights-of-Way in the Quebec Boreal Forest." 7th International Symposium on Environmental Concerns in Rights-of-Way Management, 1999; Confer, John L. "Management, Vegetative Structure and Shrubland Birds of Rights-of-Way," 7th International Symposium on Environmental Concerns in Rights-of-Way Management, 1999; CVPS. "Central Vermont Public Service Corporations 2006 Strategy; T&D Forestry," Rutland, VT, 2006; Niering, William A. "Roadside Use of Native Plants: Working with Succession, An Ecological Approach in Preserving Biodiversity." Roadside Use of Native Plants: http://www.environment.fhwa.dot.gov/ecosystems/vegmgmt_rdsduse.asp.

¹¹Utility Transmission Forestry Herbicide Use Summary Records; Priestley, p. 9; Nowak & Abrahamson.

¹²USDA, 1984; USEPA. *Environmental Stewardship Strategy for Electric Utility Rights-of-Way*, Pesticide Environmental Stewardship Program, Edison Electric Institute Vegetation Management Task Force, August 1996; Massachusetts. *333 CMR 11.00, Right of Way Management*; K.H. Deubert. *Studies on the*

then applied selectively by low-volume methods that dry quickly on the plant surface, which significantly restricts the greatest potential for off-target exposure. Additionally, anti-drift adjuvants that can be adjusted to accommodate changes in wind velocity are included in all foliage applications to further limit the likelihood of unintentional exposure to non-target organisms. Applications are also not made in situations when there is a reasonable expectation that herbicides will drift from the target, or during measurable precipitation.

The DAR established a *Sensitive Area Material List* to help reduce the potential of any negative impact by the use of herbicides in sensitive areas defined in 333 CMR 11.04. All of the herbicides on this list have gone through extensive testing to be considered for registration by Federal EPA and before being included on the *Sensitive Area Materials List* they go under further scrutiny by the Massachusetts Department of Agricultural Resources and Massachusetts Department of Environmental Protection.¹³ 333 CMR 11.00 only requires their use within limited spray sensitive areas. NSTAR's IVM program, however, considers these herbicides the primary chemical control method for their entire ROW system. Only reserving the right to set up experimental plots to test new herbicides for their effectiveness and use in protecting the ecological communities.

Selective herbicides applications do not adversely affect wetland plant composition or function according to the study cited in the *DFA Decision Concerning The Wetland Impact Study Conducted Pursuant to 333 CMR 11.04(4)(c)(2)* (Appendix 7). In fact, according to the 1989 study by Environmental Consultants, Inc. quoted in the *Decision*, mechanical vegetation control techniques result in significantly greater impact on wetland composition and function.

Fate of Garlon 3A and Tordon 101 Used in Selective Foliar Application in the Maintenance of Utility Rights-of-Way in Eastern Massachusetts, Final Report prepared for New England Electric et al., 1985; Harrison Biotech, Inc. [A Generic Environmental Impact Report on the Control of Vegetation on Utility and Railroad Rights-of-Way in the Commonwealth of Massachusetts](#), Final Report prepared for the Department of Food and Agriculture, Commonwealth of Massachusetts, 1985; N.H. Nickerson, G.E. Moore and A.D. Cutter, [Study of the Environmental Fates of Herbicides in Wetland Soils on Electric Utility Rights-of-Way in Massachusetts over the Short Term](#), Final Report prepared for New England Electric et.al., December 1994; Massachusetts Department of Agricultural Resources. [Surface Water Monitoring of Glyphosate used in Rights-of-Way Railroad Vegetation Management \(2005–2006\)](#), Report, November, 2006.

¹³ A current list of the *Sensitive Area Materials List* and individual *Fact Sheets* on these herbicides are available at: <http://www.mass.gov/eea/agencies/agr/pesticides/rights-of-way-vegetation-management.html>.

While achieving long term control, herbicide applications can be more selective than mechanical treatment methods. Selective herbicide applications encourage plant species diversity by targeting specific plants for removal. They offer varied degrees of selectivity and favor—or release—certain types of plants; for example, broadleaf vegetation can be controlled with little or no impact to grasses. A continual cycle of selective herbicide applications as part of an IVM program, therefore, promotes low-growing plant communities while reducing the density of target species.

Also, invasive, noxious and poisonous plant species are best managed by early recognition and intervention with chemical controls before a little intrusion becomes a large infestation. A quick response with the flexibility to use the appropriate control methods will reduce the likelihood of severe infestations.

Selective herbicide applications can be much less destructive than mowing to nesting sites and the vegetation necessary for food and cover. Little site disturbance is associated with selective herbicide applications. For example: to control the dense resprouts resulting from a mowing operation requires higher per acre rates of applied herbicide to achieve acceptable control than a selective herbicide/cutting application.

This is not to say that mowing is not an important component in an IVM program. Both control methods need to be used in combination with hand cutting techniques to cover all situations. In fact, thoughtful, carefully planned, selective herbicide applications in combination with mechanical controls, where appropriate, actually promote wildlife habitat by encouraging plant species diversity.¹⁴

State-of the-art herbicide application equipment and the requirement that contractors apply herbicides in the most judicious manner possible further minimizes environmental site damage. Herbicides, particularly when applied selectively by low-volume methods dry quickly on the plant surface, thereby significantly restricting the greatest potential for dermal exposure. The use of anti-drift adjuvants in all foliage

¹⁴ A short list of examples includes: W.C. Bramble and W.R. Burns. *A long-term ecological study of game food and cover on a sprayed utility right-of-way*. Purdue University. 1974. Bulletin No. 918:16; Richard H. Yahner. *Wildlife Response to More than 50 years of Vegetation Maintenance on a Pennsylvania U.S., Right-of-Way*. Journal of Arboriculture 30(2), March 2004: 123; James S. Marshall and L.W. Vandruff. *Impact of Selective Herbicide Right-of-Way Vegetation Treatment on Birds*. Environmental Management, December 2002. Vol. 30, No. 6: 801-806.

applications that can be adjusted to accommodate changes in wind velocity further limit the likelihood of unintentional exposure to non-target organisms.

The selection of the herbicides coupled with the appropriate treatment methods is made with consideration given to the environmental sensitivity of a ROW or site within a ROW. For example, target species, such as non sprouting conifers, are generally not treated since herbicide treatment is not necessary for control. Exceptions to this general guideline are made where White Pine regeneration has seeded in large thick “carpets” and mowing would be more destructive than an herbicide application.

The herbicides and treatment methods used on any given ROW are selected based on site sensitivity, target species composition and density, and treatment methods. Herbicides will not be used in certain areas if site sensitivity, regulations, new restrictions, or target species composition or height recommend otherwise. NSTAR chooses the most appropriate treatment methods to meet all of its goals, objectives and obligations and the most scientifically sound, environmentally friendly solution is to use all three components of IVM where appropriate.

10. NATURAL CONTROLS: THE INDIRECT COMPONENT OF INTEGRATED VEGETATION MANAGEMENT

Natural control is the process of working with the biological cycles of plant succession and interspecies competition to ultimately help stabilize early successional plant communities (low growing plant communities). Natural controls lower the dependence on chemical and mechanical controls. However, impeding the natural process of plant succession requires the use of all three components of IVM; IVM is a critical part of sustaining natural control. All three depend upon the others in a continuous cycle that employs the unique advantages of each to control undesirable vegetation and encourage the stability of desirable plant communities.

Facilitating the spread and stabilization of early successional plant communities that compete for light, moisture and nutrients inhibits the germination and growth of tree seedlings. It also reduces the density and inhibits the growth of undesirable plant species. As a result, natural control decreases the amount of herbicide needed for vegetation control. The link between natural, chemical and mechanical controls is a close back-and-forth relationship. Natural controls cannot be established without chemical and mechanical controls while the amount of herbicides applied is reduced by the use of natural controls.

How does this work? Early successional plant communities are established and stabilized through the use of selective herbicide and mechanical applications. For example, the removal of invasive species by chemical controls opens up a void into which native plants can return. This helps re-establish and maintain early successional native plant communities that are adapted to their environment. Promoting low growing native plants are a vital part of natural control because native plants have a much better chance for survival, especially during adverse growing conditions, than planted vegetation that often fails due to site-species incompatibility.

Chemical and mechanical controls also support the establishment of plant communities that inhibit or interfere with tree seed germination or growth. Competition for sunlight, nutrients and water along with wildlife depredation (i.e. browsing) according to the long term studies by W.C. Bramble, W.R. Burns, et al. are the primary factors in the natural control of trees on electric ROWs. Research is also still underway about the

“natural herbicide action” of allelopathy, the chemical inhibition of the germination or growth of plants by others. Scientists have been studying allelopathy since the 1880s, and many now believe that it occurs commonly around the world, although the complexity of this chemical process is still incompletely understood (see references).

Instead of relying on only one part of IVM, the combination of the direct methods of mechanical and chemical controls with natural controls has a net benefit for the environment. IVM allows for treatment cycles to be lengthened and with fewer undesirable species on the ROW that require control, the amount of herbicides applied and mechanical controls decrease in future treatment cycle until they reach minimal application rates.

11. DEFINITION, IDENTIFICATION AND TREATMENT OF SENSITIVE AREAS

Per 333 CMR 11.02, sensitive areas are "any areas within rights-of-way...in which public health, environmental or agricultural concerns warrant special protection to further minimize risks of unreasonable adverse effects." They include, but are not limited to, the following:

Water Supplies

- Zone I's¹⁵
- Zone II's
- IWPA's (Interim Wellhead Protection Areas)
- Class A Surface Water Sources
- Tributaries to a Class A Surface Water Source
- Class B Drinking Water Intakes
- Private Wells

Surface Waters

- Wetlands
- Water Over Wetlands
- The Mean Annual High Water Line of a River
- The Outer Boundary of a Riverfront Area
- Certified Vernal Pools

Cultural Sites

- Agricultural Areas
- Inhabited Areas

Wildlife Areas

- Certified Vernal Pool Habitat
- Priority Habitat.

Sensitive areas consist of *no-spray areas* in which herbicide use is prohibited, *limited spray areas*, and areas that require special treatment recommendations. Protecting all of these environmentally sensitive sites is accomplished by establishing limited spray and no-spray areas and treatment restrictions based on the sensitivity of each site and the requirement to minimize any unreasonable adverse impacts within that area (See Appendix 5).

¹⁵NSTAR's policy is to follow the strictest distance restrictions on Zone I's so that no mistakes are made on identifying well types.

Only herbicides specified by the Department as acceptable for use in *sensitive areas* pursuant to the Cooperative Agreement [Memorandum of Understanding] executed between the Department of Agricultural Resources and the Department of Environmental Protection on July 1-2, 1987, or future amendments thereto, shall be used in sensitive areas (333 CMR 11.04(1)(d)).

The herbicides included in the resulting *Herbicides Recommended for Use in Sensitive Areas List* (*Sensitive Area Materials List*) will be applied in limited spray areas according to the application restrictions in 333 CMR 11.04 or in the case of Priority Habitat, approval of the YOP by the Natural Heritage and Endangered Species Program of the Massachusetts Department of Fisheries and Wildlife (NHESP). A current copy of the *Sensitive Areas Materials List* and Massachusetts Department of Agricultural Resources approved active ingredient fact sheets are available at:

<http://www.mass.gov/eea/agencies/agr/pesticides/rights-of-way-vegetation-management.html>.

IDENTIFICATION OF SENSITIVE AREAS

Sensitive areas can be divided into two additional categories that help identify and treating them: “*readily identifiable in the field*” and “*not readily identifiable in the field.*” Readily identifiable in the field areas will be treated, identified and when appropriate, marked according to all applicable restrictions listed in 333 CMR 11.00. Not readily identifiable in the field areas will likewise be treated and marked when appropriate, but they are identified in the field by the use of data marked on maps and collected in the YOP and notification processes.

- Sensitive areas usually identifiable in the field, include but are not limited to: surface water, some private and public water supplies, wetlands, inhabited and agricultural areas
- Sensitive areas not usually identifiable in the field, including, but are not limited to: designated public surface water supplies, public ground water supplies, some private drinking supplies, the first 400 feet of water supply tributaries, certified vernal pools and Priority Habitat of State-listed Species.

As appropriate, therefore, sensitive areas will be identified and when necessary marked in the field by NSTAR staff, an experienced vegetation management treatment crew point person, individuals trained in the identification of sensitive areas that require the use of GIS (geographic information systems) and GPS equipment, and/or by a NHESP approved botanist trained in the delineation of state-listed species.

NSTAR and contractor personnel assigned the task of identifying sensitive areas in the field will use the following sources and methods:

- Massachusetts Department of Environmental Protection (DEP) water supply maps/GIS mapping layers available through Mass GIS
- Massachusetts Department of Agricultural Resources (DAR) records of identified private wells along the ROW
- Correspondence, meetings and input from municipalities within the forty-five day YOP and twenty-one day municipal right-of-way notification letter review and comment periods and the 48 hour newspaper notification (under 333 CMR 11.06 & 11.07 and Chapter 85 of the Acts of 2000)
- Correspondence, meetings and input from NSTAR's abutter and/or landowner notification procedure, as applicable
- NSTAR's maps, records and institutional knowledge
- Any additional pertinent information that becomes available during the YOP process and throughout the five years of this VMP
- A point person who verifies identified sensitive areas and any additional areas that may require special precautions
- USGS topographical maps
- Information from contractor's knowledge and records
- Information from Mass GIS
- Confidential information from NHESP
- A copy of the YOP and VMP
- Treatment crew(s) are required to have the following references on the job site to help identify sensitive areas:
 - ✓ Topographical maps (electronic or paper)
 - ✓ Copy of YOP
 - ✓ Any additional information that may become available.

Maps are a resource and a tool for both the public and the vegetation management crews, therefore, they contain the data needed to identify, mark and treat sensitive areas appropriately and are in compliance with all applicable regulations.

Maps included in the YOP are updated every year as new data becomes available. Some sensitive areas are contained on the base USGS topographic maps such as applicable Wetland Resource Areas (Rivers, Wetlands, etc.) The most current data available through MassGIS such as public water supplies and certified vernal pools and any data that NSTAR has collected to date on items such as private wells are then added

on top of the USGS data. At the time of treatment, additional sensitive areas will be added to the maps utilized by NSTAR's vegetation management contractors. Please note that to enable any viewer to see the important information on the maps, Zone II's and other limited spray areas are not mapped in areas where NSTAR only uses herbicides on the *DAR Rights-of-Way Sensitive Area Materials List*.

The locations of the Priority Habitats of state listed species as regulated by the Natural Heritage and Endangered Species Program (NHESP) of the Division of Fisheries & Wildlife are only included on field maps to contractors who sign a confidentiality agreement expressly for this purpose. A map layer of Priority Habitats is available to the general public at <http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis> but it is neither specific to areas of concern for herbicide applications nor does it include data on the individual species since the exact location and details of their habitat is protected. Please be assured that we follow all necessary precautions to stay in compliance with 321 CMR 10.00 and this YOP was approved by NHESP.

CONTROL STRATEGIES FOR SENSITIVE AREAS:

Mandated sensitive areas will be treated following the restrictions in applicable state and federal regulations. NSTAR also reserves the right to designate additional areas as areas that require special treatment considerations including, but not limited to, landowner agreements, visual or environmental impact considerations, and other considerations that arise during the treatment cycles.

Treatments in all sensitive areas will follow the operational guidelines and restrictions listed above, as well as the guidelines described in the Sensitive Area Table in Appendix 5.

Wetlands

Pursuant to 333 CMR 11.04 (4) (c) (2), based upon the results of two ROW wetland impact studies, the Massachusetts Department of Agricultural Resources in consultation with the Department of Environmental Protection and the VMP Advisory Panel, made a determination that herbicides, when used at various utilities including electric lines and gas pipelines, under the guidance of an IVM

program and other conditions as set forth in the determination, have less impact on wetlands than mechanical only techniques. Therefore in accordance with the conditions of the Department's determination, NSTAR will selectively apply herbicides to wetland sites, except within ten feet of standing and flowing water and to conifers which will be cut (Appendix 5).

Public and Private Water Supplies

Appropriate sources and references will be consulted to determine the location of public and private water supplies. NSTAR's YOP maps will include all known public and private water supplies at the time of printing using the sources listed above, and the mapping information used by contract treatment crews will be updated as necessary during the treatment cycle.

To aid in the public and private water supply identification process, under 333 CMR 11.01(3)¹⁶, NSTAR requests that during the various federal, state and voluntary notification processes and during the treatment cycle, that public and municipal agencies and private entities and individuals share information on new or unidentified public and private water supplies.

Identified private drinking supplies within one hundred feet of a ROW are included in our permanent records and maps, and landowners are encouraged to post signs on the edge of the ROW to help identify private water supplies (the no-spray treatment area is fifty feet from a private well).

A point person will patrol the ROW to verify sensitive areas and buffers are appropriately measured and when applicable flagged, and recorded for permanent record.

Massachusetts Endangered Species Act

NSTAR recognizes the importance of the Massachusetts Endangered Species Act, M.G.L.C. 131 A, and its significance to ROW vegetation management. NSTAR will comply with all applicable portions of this Act and the

¹⁶333 CMR 11.01(3): "[The Specific goals of 333 CMR 11.00 are to] Ensure ample opportunity for public and municipal agency input on potential impacts of herbicide application to rights-of-way in environmentally sensitive areas."

regulations promulgated thereunder. NSTAR will also follow the rules and prohibitions directed at human activities which Take Species or alter their Significant Habitat (as of this printing there are no designated Significant Habitat in Massachusetts).

321 CMR 10.14, Massachusetts Endangered Species Act Regulations, Part II Exemptions and 333 CMR 11.04(3)(a-c) exempts utility ROW vegetation management from the permit process under the following conditions:

(12) The management of vegetation within existing utility rights-of-way provided that the management is carried out in accordance with a vegetation management plan approved in writing by the Division prior to the commencement of work for which a review fee shall be charged, the amount of which shall be determined by the commissioner of administration under the provisions of M.G.L. c.7, § 3B...

and for roadside distribution lines

(6) installation, repair, replacement, and maintenance of utility lines (gas, water, sewer, phone, electrical) for which all associated work is within ten feet from the edge of existing paved roads;

To comply with exemption 10.14(12), NSTAR will submit this VMP and YOPs to the NHESP for review.

The NHESP has delineated areas as Priority Habitat based on the "Best Scientific Evidence Available" to protect State-listed species from a "take." Under the approval process, details about the Priority Habitat of state-listed species that might be affected by our activities and management recommendations are shared with NSTAR under strict confidentiality agreements.¹⁷ Using this data and best management practices, NSTAR and contract personnel will follow the appropriate vegetation management treatment methods within these sensitive areas taking all practical means and measures to modify ROW vegetation management procedures to avoid damage to state-listed species and their habitat.

To identify Priority Habitats, NSTAR personnel, NHESP approved review botanists and vegetation management crews must use proper identification

¹⁷A map layer of Priority Habitat is available to the general public at <http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis> , but it is neither specific to the areas of concern for herbicide applications nor does it have detailed data on the species of concern; the exact location and details of their habitat is kept confidential for their protection.

procedures. Contractors are, therefore, required to train their personnel to recognize the location of Priority Habitats using one of the following tools: paper maps, GPS coordinates and/or GIS systems.

12. NSTAR DESIGNATED SENSITIVE AREAS

Above and beyond 333 CMR 11.00 and other applicable state and federal regulations, NSTAR designates two types of visual buffers to screen the general public from potentially objectionable views of structures and substations: shrub and tree/shrub buffers. These sites include, but are not limited to, locations where ROW's cross roads, recreational areas, and inhabited areas:

- Shrub buffers are mostly at road crossings. All trees and shrub species that may grow into the conductor security zone are removed
- Tree/shrub buffers are used only where sites are extremely sensitive and shrub growth is inadequate for screening. Trees and shrub species that may grow into the conductors will be removed. Selective trimming will be used where removal is not recommended or practical.

13. OPERATIONAL GUIDELINES FOR APPLICATORS RELATIVE TO HERBICIDE USE

NSTAR relies on independent vegetation management contractors and requires that they comply with all applicable federal and state laws and regulations. This VMP, the YOPs and information in the Notification documentation are the operational guidelines for applicators relative to herbicide use. Therefore, according to the regulations, at a minimum, the contractor's application crews shall have a copy of the YOP accessible at the work site.

In addition to the guidelines contained in other sections of the VMP, this section sets forth the general operational guidelines for vegetation management. All guidelines are based on the requirement that both the contractor(s) and NSTAR are responsible to insure that vegetation management activities are conducted in a professional, safe, efficient manner, with special attention directed towards minimal environmental impact.

NSTAR will alter or add to these guidelines based on possible future changes or additions to state and federal regulations that apply to herbicide applications and all changes or additions will be approved by DAR.

NSTAR PERSONNEL

- The following individual is responsible for monitoring, supervising and coordinating vegetation management programs (individual RFP's may direct contractors to communicate with other NSTAR personnel):

William Hayes, Senior Arborist
NSTAR Electric & Gas Corporation
Planning, Scheduling and Contract Services Department
One NSTAR Way, SE-370
Westwood, MA 02090-9230
781-441- 3932 (office)

- The arborist(s) will inform the contractor which ROWs will be treated, the range of treatment dates and any other specification required to complete the job
- NSTAR will provide ROW maps with treatment restriction lists and written instructions outlining any special treatment considerations or instructions

- Contractors will notify the NSTAR company representative(s) of any questions or complaints from the public and/or government agencies that relate to ROW vegetation management. NSTAR will deal with these complaints or questions in a timely fashion.

CONTRACTOR SAFETY, CONTRACT AND LEGAL COMPLIANCE GUIDELINES

- Contractors must provide qualified, personnel who have been trained to recognize and identify target and non-target vegetation and are knowledgeable in the safe and proper use of both mechanical and chemical vegetation management techniques
- All personnel applying herbicides in Massachusetts must hold a pesticide applicator license and must work under the on-site supervision of a certified applicator, with a Category 40 certification
- Herbicides will be handled and applied only in accordance with label instructions
- Mixing will not be done on the ROW
- Contractors are not expected to start work without the appropriate maps, restriction lists, landowner notifications and mixing rate instructions
- Contractors will be in compliance with the latest revisions of all industry standards including, but not limited to all applicable safety standards under the Occupational Safety and Health Act (OSHA), ANSI Z133 & ANSI 300 standards, and NSTAR Safety Procedures
- All contract personnel will follow label instructions regarding Personal Protective Equipment (PPE)
- All contract personnel will follow NSTAR's safety requirements as outlined in the NSTAR TVMP
- Applicators will immediately cease operations if adverse conditions or other circumstances warrant
- Access to a ROW will be through the use of established roadways whenever possible
- All bar-ways and gates shall be immediately closed
- Care shall be exercised to prevent the rutting or destruction of roadways, fields or any other form of access
- No litter of any kind will be left on the ROW or adjoining land.

CONTRACTOR DAILY TASKS

- Call the appropriate NSTAR personnel
- In compliance with both regulations and NSTAR policy, the contractors' foreman or senior crew member must complete daily vegetation management reports that include:
 - ✓ Date, name and address of vegetation management contractor(s)
 - ✓ Identification of site or work area
 - ✓ List of crew members
 - ✓ Type of equipment and hours used, both mechanical and chemical
 - ✓ Method of application and description of target vegetation
 - ✓ Amount, concentration, product name of herbicide(s), adjuvants and dilutants (EPA registration numbers must be on file)
 - ✓ Weather conditions
 - ✓ Notation of any unusual conditions or incidents, including public inquiries
 - ✓ Recording and/or verification of sensitive areas on ROW maps
- All required forms will be distributed to the contractors by the NSTAR representative(s)
- NSTAR request that contractor(s) call if they see a hazard tree
- Contractors must follow the Specifications noted in the RFP's.

EQUIPMENT

- NSTAR will not dictate the exact equipment to be used by the contractors, instead, all equipment shall be of adequate design to produce professional quality results
- Equipment must be maintained in good working condition, including being calibrated as appropriate
- Care and common sense shall be exercised when moving vehicles and equipment.

LANDOWNERS

Landowners are individuals whose property is either under NSTAR's ROW easements and/or abuts the ROW.

- Landowners will be treated with courtesy and respect at all times
- Permission must be obtained for ingress and egress if entering the ROW from private land
- If a landowner demands vegetation maintenance cease, the contractor should remove the crew and equipment off the property, inform the appropriate NSTAR

representative as soon as possible and wait for clearance before returning to that location

- When addressing serious complaints from a landowner, or other concerned person, notice will be sent to the appropriate authorities at DAR.

RESULTS

- Vegetation management programs must result in 95% control of all target species
- The contractor may be held responsible to re-treat areas that do not meet required results as long as these “touch-up” treatments follow all restrictions in 333 CMR 11.03(8) as listed in the *Control Strategies for Sensitive Area* table in Appendix 5
- Vegetation management crews will exercise care to insure that low-growing desirable vegetation and other non-target organisms are not unreasonably affected by the application of herbicides
- Unreasonable site damage or destruction during any phase of the vegetation management operation by the contractor, his agents or employees, will be repaired immediately by said contractor to NSTAR's satisfaction.

14. ALTERNATIVE LAND USES

Wherever practical, as determined by the Senior Arborist or NSTAR management, NSTAR will cooperate with landowners through whose property NSTAR own easements, to facilitate "alternative land use" practices by the landowner(s) that may reduce or eliminate the need for vegetation management by NSTAR.

15. REMEDIAL SPILL AND EMERGENCY PLAN

NSTAR contracts with independent, professional, certified herbicide applicators that are responsible for the containment, clean up and reporting of chemical spills or accidents. The following is a guide to the information sources that, according to various regulations, must be available to the treatment crew in the event of a chemical spill or emergency situation:

A. Technical Reference Materials:

- a. Product Label
- b. Product Material Safety Data Sheet (MSDS)
- c. Product Fact Sheet, if available

B. **Table 1. Herbicide Manufacturers:**

MANUFACTURER	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
BASF Corporation	800-832-4357	
Dow Agro Sciences	800-992-5994	
E.I. du Pont de Nemours and Company	800-441-3637	Medical Emergencies
Monsanto	314-694-4000	
Nufarm	877-325-1840	Medical Emergencies
Rainbow Treecare	877-272-6747	

C. **Table 2. State Agencies:**

STATE AGENCY	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
Massachusetts Pesticide Bureau	617-626-1700	A.S.A.P. (within 48 hours)
Massachusetts Department of Environmental Protection, Division of Hazardous Waste	Main Office: 617-292-5500	For emergencies involving reportable quantities of hazardous materials; required info: City/town, street address, site name (if applicable), material
	Southeast Region: 508-946-2700	
	Northeast Region: 978-694-3200	
	Central Region: 508-792-7650	
Massachusetts Dept of Public Health, Bureau of Env.Health Assessment Toxilogical Program	617-624-5757	
Massachusetts Poison Information Centers	800-682-9211	For medical emergencies involving suspected or known pesticide poisoning symptoms

D. Table 3. Emergency Services:

EMERGENCY SERVICE	TELEPHONE NUMBER	SPECIAL INSTRUCTIONS
Massachusetts State Police, Central Office	617-566-4500 or 911	
Local Fire / Police Dept.	911	
ChemTrec	800-424-9300	
Clean Harbors	800-OIL-TANK	
Pesticide Hotline	800-858-7378	PST: 6:30 am – 4:30 pm, Web: www.NPIC.orst.edu

E. NSTAR's contact in the case of a spill or accident is:

NSTAR System Control:
Ops North, 617-541-7825,
Electric Ops South, 617-541-7858,
Gas Ops, 781-441-8400

F. Table 4. Local Emergency Numbers:

Emergencies Services for All Municipalities: 911

(to be filled out with the appropriate towns and included in the YOPs)

Town	Board of Health	Town/City Hall	Town	Board of Health	Town/City Hall

CLEAN-UP PROCEDURES

Education and attention will constantly be directed at accident and spill prevention, however, the following is a guideline in the event of an unfortunate incident:

REPORTABLE SPILLS (Spills of reportable quantity of material): FOLLOW STEPS 1-11
NON-REPORTABLE SPILLS: FOLLOW STEPS 1, 2, 3, 4, 7, 8 & 9 and contact the NSTAR representative.

Table 5: HERBICIDE SPILL CHECK LIST

Order	ACTION	Done (✓)
1	Use any and all PPE as directed by product label or MSDS.	
2	Cordon-off spill area to unauthorized people and traffic to reduce the spread and exposure of the spill	
3	Identify source of spill and apply corrective action, if possible stop or limit any additional amounts of spilled product.	
4	Contain spill and confine the spread by damming or diking with soil, clay or other absorbent materials.	
5	Report spills of "reportable quantity" to the Mass. DEP and DAR:	
	Massachusetts DAR, Pesticide Bureau	(617) 626-1700
	Massachusetts Department of Environmental Protection, Division of Hazardous Waste	Main Office: (888) 304-1133
		Southeast Region: (508) 946-2700
		Northeast Region: (978) 694-3200
6(If the spill cannot be contained or cleaned-up properly, or if there is a threat of contamination to any bodies of water, immediately contact any of the following applicable emergency response personnel:	
	local fire, police, rescue	911
	NSTAR: Operations	(617) 541-7821
	NSTAR Transmission: William Hayes	(781) 441-3932
	NSTAR Distribution - South: Paul Sellers	(508) 957-4603
	NSTAR Distribution – North: Chris Fallon	(781) 441-3837
	NSTAR Gas- Steve Megaro,	781-441-8959
	Product Manufactures	
	1. BASF Corporation	(800) 832-4357
	2. Dow Agro Sciences	(800) 992-5994
	3. E.I du Pont de Nemours & Company	(800) 441-3637
	4. Monsanto	(314) 694-4000
	5. Nufarm	(877) 325-1840
	6. Rainbow Treecare	(877) 272-6747
	Chemtrec	(800) 424-9300
	additional emergency personnel	
	If there is a doubt as to who should be notified, contact State Police, Central Office	(617) 566-4500 or 911
7	Remain at the scene to provide information and assistance to responding emergency clean-up crews	
8	Refer to the various sources of information relative to handling and cleanup of spilled product	
9	If possible, complete the process of “soaking up” with absorbent materials	
10	Sweep or shovel contaminated products and soil into leak proof containers for proper disposal at approved location	
11	Spread activated charcoal over spill area to inactivate any residual herbicide	

APPENDIX 1:
ELECTRIC SYSTEM MAPS

APPENDIX 2:
LIST OF MUNICIPALITIES

APPENDIX 3:
333 CMR 11.00

APPENDIX 4:
CHAPTER 132B

APPENDIX 5:
SENSITIVE AREA TABLE

APPENDIX 6:
PREFACE TO 310 CMR 10.00

APPENDIX 7:
WETLANDS STUDY

APPENDIX 8:
CHAPTER 85, SECTION 10

APPENDIX 9:
IDENTIFICATION AND QUALIFICATIONS OF INDIVIDUAL WRITING THE PLAN

APPENDIX 10:
REFERENCES